$E_1 =$	1804, Oct. 5·458644	log M.	9·72263(*n*)
$E_0 =$	1805, Jan. 0·000000	log 206265″	5·31442
$\tau^d =$	86^d·541356	log(s_{23}	5·03705(*n*)

log τ^d	1·93722	$(s_{23}) =$	−108905″	L =	−10° 28′ 45″
log m''	2·91514	$(s_{24}) =$	71180	Π =	52 30 23
log (s_{24})	4·85236	L″ =	− 37725	$L_0 =$	41 58 22

Syra, Greece : 1903 *August* 20.

Ephemeris for Physical Observations of Saturn, 1903–4. By A. C. D. Crommelin.

The discovery by Professor Barnard of a conspicuous white spot on *Saturn* last July has reawakened interest in the question of the planet's rotation, and has illustrated the remarkable variation of rate that prevails in different latitudes. At Mr. Denning's suggestion I have computed an ephemeris giving the longitudes of central meridian and the times of transit of the zero meridian on two assumptions as to the rotation period, viz. :

System I. $10^h\ 14^m{\cdot}4$ for equatorial spots (Hall).

System II. $10^h\ 37^m{\cdot}92$ for the spot discovered by Barnard last July (period provisionally deduced by Denning).

The quantities corresponding to P, B, *B* in the *Jupiter* ephemeris may be taken from the *Nautical Almanac* ephemeris of the ring, or more conveniently from the *Connaissance des Temps*, as this is fuller and contains the longitude of the Earth in the plane of the ring. In order to utilise the data of the *Connaissance* without interpolation, I give the longitude of the central meridian for Paris midnight, corresponding to $11^h\ 50^m{\cdot}65$ G.M.T.; but the transits of zero meridian are given for G.M.T. The quantities are to be interpolated for the time for which they are required, the equation of light having been already applied. The approximate increase of the longitude of central meridian in five days is 4219° in System I., 4063° in System II. I have commenced a new system of zero meridians, as Mr. Marth used a different period of rotation ($10^h\ 13^m{\cdot}6$) in his ephemerides, of which the last appeared in vol. lv. p. 164. The small figures between the transits of zero meridians denote the number of intervening rotations, and the table at the end facilitates the determination of the times of intervening transits.

Paris Midnight.		Light Time.	Longitude of Central Meridian. I. 843°·750.	II. 812°·641.	G.M.T. of Preceding Transit of Zero Meridian. System I.		System II.	
1903.		m	°	°	h m		h m	
June	8	77·49	0·00	0·00	1 36·3	12	1 12·8	12
	13		259·23	103·69	4 28·3	12	8 46·9	11
	18	76·45	158·47	207·36	7 20·2	12	5 43·2	11
	23		57·70	311·01	10 12·2	11	2 39·6	12
	28	75·63	316·94	54·66	2 49·8	12	10 13·8	11
July	3		216·17	158·33	5 41·8	12	7 10·1	11
	8	75·01	115·39	262·01	8 33·7	12	4 6·4	12
	13		14·60	5·68	11 25·7	11	11 40·7	11
	18	74·59	273·81	109·33	4 3·4	12	8 37·0	11
	23		172·98	212·94	6 55·5	12	5 33·4	11
	28	74·44	72·11	316·53	9 47·6	11	2 29·8	12
Aug.	2		331·21	60·09	2 25·6	12	10 4·2	11
	7	74·52	230·28	163·61	5 17·7	12	7 0·8	11
	12		129·31	267·10	8 10·0	12	3 57·4	12
	17	74·85	28·28	10·53	11 2·4	11	11 32·0	11
	22		287·20	113·92	3 40·5	12	8 28·8	11
	27	75·43	186·07	217·24	6 33·1	12	5 25·7	11
Sept.	1		84·89	320·53	9 25·8	11	2 22·7	12
	6	76·21	343·64	63·74	2 4·1	12	9 57·7	11
	11		242·34	166·91	4 57·0	12	6 54·9	11
	16	77·18	140·98	270·01	7 50·0	12	3 52·2	12
	21		39·57	13·07	10 43·1	11	11 27·5	11
	26	78·29	298·10	116·06	3 22·0	12	8 25·0	11
Oct.	1		196·56	218·98	6 15·2	12	5 22·6	11
	6	79·54	94·96	321·85	9 8·5	11	2 20·3	12
	11		353·31	64·67	1 47·6	12	9 56·1	11
	16	80·87	251·62	167·45	4 41·1	12	6 53·9	11
	21		149·88	270·18	7 34·7	12	3 51·8	12
	26	82·24	48·10	12·87	10 28·5	11	11 27·8	11
	31		306·27	115·52	3 7·9	12	8 26·0	11
Nov.	5	83·62	204·41	218·12	6 1·8	12	5 24·2	11
	10		102·51	320·69	8 55·7	12	2 22·4	12
	15	84·96	0·56	63·23	11 49·7	11	9 58·7	11
	20		258·61	165·75	4 29·2	12	6 56·9	11
	25	86·22	156·64	268·25	7 23·2	12	3 55·3	12
	30		54·66	10·74	10 17·3	11	11 31·6	11
Dec.	5	87·38	312·66	113·21	2 57·0	12	8 30·1	11
	10		210·66	215·67	5 51·1	12	5 28·5	11

Paris Midnight.		Light Time.	Longitude of Central Meridian. I. 843°·750.	II. 812°·641.	G.M.T. of Preceding Transit of Zero Meridian. System I.		System II.	
1903.		m	°	°	h m		h m	
Dec.	15	88·41	108·65	318·13	8 45·2	12	2 26·9	12
	20		6·65	60·60	11 39·3	11	10 3·3	11
	25	89·27	264·65	163·06	4 18·9		7 1·7	
1904.								
May	13	81·68	301·20	164·29	3 16·5	12	6 59·5	11
	18		200·30	267·77	6 8·8	12	3 56·2	12
	23	80·30	99·36	11·27	9 1·1	11	11 30·7	11
	28		358·45	114·80	1 38·9	12	8 27·2	11
June	2	78·98	257·57	218·36	4 31·1	12	5 23·8	11
	7		156·72	321·96	7 23·2	12	2 20·2	12
	12	77·72	55·91	65·58	10 15·2	11	9 54·5	11
	17		315·10	168·22	2 52·9	12	6 50·8	11
	22	76·60	214·30	272·86	5 44·9	12	3 47·2	12
	27		113·52	16·52	8 36·9	12	11 21·4	11
July	2	75·62	12·74	120·19	11 28·9	11	8 17·7	11
	7		271·97	223·87	4 6·5	12	5 14·0	11
	12	74·84	171·20	327·54	6 58·5	12	2 10·3	12
	17		70·41	71·20	9 50·5	11	9 44·5	11
	22	74·27	329·62	174·86	2 28·1	12	6 40·8	11
	27		228·82	278·51	5 20·2	12	3 37·2	12
Aug.	1	73·91	127·99	22·13	8 12·2	12	11 11·4	11
	6		27·13	125·72	11 4·3	11	8 7·9	11
	11	73·82	286·23	229·28	3 42·2	12	5 4·4	11
	16		185·30	332·81	6 34·4	12	2 1·0	12
	21	73·97	84·33	76·30	9 26·7	11	9 35·5	11
	26		343·32	179·75	2 4·7	12	6 32·2	11
	31	74·36	242·26	283·15	4 57·2	12	3 28·9	12
Sept.	5		141·15	26·50	7 49·8	12	11 3·7	11
	10	74·99	39·98	129·79	10 42·4	11	8 0·7	11
	15		298·75	233·03	3 20·8	12	4 57·7	11
	20	75·82	197·47	336·21	6 13·6	12	1 54·9	12
	25		96·12	79·33	9 6·6	11	9 30·1	11
	30	76·84	354·71	182·39	1 45·3	12	6 27·5	11
Oct.	5		253·25	285·40	4 38·4	12	3 24·9	12
	10	78·00	151·74	28·36	7 31·7	12	11 0·4	11
	15		50·16	131·26	10 25·0	11	7 58·0	11
	20	79·29	308·54	234·10	3 4·0	12	4 55·8	11
	25		206·87	336·90	5 57·6	12	1 53·6	12
	30	80·62	105·15	79·65	8 51·2	12	9 29·5	11

Paris Midnight.	Light Time.	Longitude of Central Meridian. I. 843°·750.	II. 812°·641.	G.M.T. of Preceding Transit of Zero Meridian. System I.		System II.	
1904.	m	°	°	h m		h m	
Nov. 4		3·39	182·36	11 44·8		6 27·5	
					11		11
9	82·00	261·58	285·02	4 24·2		3 25·5	
					12		12
14		159·74	27·65	7 18·0		11 1·6	
					12		11
19	83·37	57·86	130·24	10 11·9		7 59·8	
					11		11
24		315·96	232·81	2 51·3		4 58·0	
					12		11
29	84·68	214·05	335·36	5 45·3		1 56·3	
					12		12
Dec. 4		112·10	77·88	8 39·3		9 32·6	
					12		11
9	85·92	10·13	180·38	11 33·4		6 30·9	
					11		11
14		268·15	282·87	4 12·9		3 29·3	
					12		12
19	87·04	166·16	25·35	7 7·0		11 5·7	
					12		11
24		64·17	127·83	10 1·1		8 4·1	
					11		11
29	88·01	322·18	230·31	2 40·7		5 2·5	

The following interpolation table gives the quantities to apply to any transit of the zero meridian in order to obtain the neighbouring transits :

	Increase of Central Meridian in 5 days.	6 Rotations.	5 Rotations.	4 Rotations.	3 Rotations.	2 Rotations.	1 Rotation.
	°	h m	h m	h m	h m	h m	h m
System I.	4219·2	61 26·0	51 11·7	40 57·3	30 43·0	20 28·7	10 14·3
	4218·8	26·4	12·0	57·6	43·2	28·8	14·4
	4218·4	26·7	12·3	57·8	43·4	28·9	14·5
	4218·0	27·1	12·5	58·0	43·5	29·0	14·5
System II.	4063·7	63 47·1	53 9·2	42 31·4	31 53·5	21 15·7	10 37·8
	4063·3	47·4	9·5	31·6	53·7	15·8	37·9
	4062·9	47·8	9·8	31·9	53·9	15·9	38·0
	4062·5	48·2	10·2	32·1	54·1	16·1	38·0

The argument is, of course, found by taking the difference of consecutive values of "longitude of Central Meridian." Only the unit and first decimal figures of the difference need be considered.

55 *Ulundi Road, Blackheath, S.E.:*
1903 *December* 11.